REMARKS

This paper is responsive to a Final Office action dated July 17, 2006. Claims 1, 3-26, and 28-60 were examined.

Finality of Action

The Office Action admits that there are new grounds of rejection. For example, a new ground of rejection utilizing newly cited art was presented in rejecting claim 26 (Akioka in combination with Koazechi). Originally presented claim 27 was put in independent form by incorporating the limitations of claim 27 into claim 26 in the response to the non-final Office action filed on June 9, 2006. As stated in MPEP § 706.07(a) "[a] second or any subsequent action on the merits in any application . . . should not be made final if it includes a rejection, on prior art not of record, of any claim amended to include limitations which should reasonably have been expected to be claimed." Akioka was clearly prior art not of record, was utilized in rejecting claim 26, and claim 26 was an originally presented claim (original claim 27). Accordingly, Applicants respectfully maintain that the finality of the rejection was improper and respectfully request that the finality be withdrawn.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 20, 26, 55, and 59-60 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 5,563,502 to Akioka et al. (hereinafter, "Akioka") in combination with U. S. Patent No. 5,568,045 to Koazechi (hereinafter, "Koazechi").

Regarding claim 1, Applicants respectfully maintain that Akioka, alone or in combination with Koazechi or other references of record, fails to teach or suggest

> the base current is proportional to a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities, the voltage difference being formed across the resistor,

as required by claim 1. The Office action relies on resistor R3, which is coupled to the base of bipolar transistor Q8, of Akioka to supply this teaching. Fig. 2, 3, and 8. Akioka teaches forming a difference voltage between base-to-emittter voltages VBE of respective bipolar transistors Q1 and Q2 across a resistive element R2. Col. 4, lines 40-42. Resistive element R2 is coupled between the emitter of bipolar transistor Q2 and ground. Fig. 2, 3, and 8. In addition, Akioka teaches that bipolar transistor Q8 is configured to generate a voltage VBE which is added to K*VT to provide an output voltage VREF free of temperature dependence. Col. 5, lines 1-4. Akioka teaches that the current proportional to the thermal voltage VT flows through M4 and that this current also flows through the resistive element R3. Col 4, line 63-col. 5, line 1. Nowhere does Akioka teach or suggest a bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, and a resistor coupled to the base of the bipolar transistor, wherein the base current is proportional to a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities, the voltage difference being formed across the resistor, as required by claim 1.

Koazechi fails to compensate for the shortcomings of Akioka. Koazechi teaches the voltage difference DVBE between base-emitter voltages VBE20 and VBE24, which appears across resistor 2. Col. 4, lines 14-21. Resistor 2 of Koazechi is coupled to the emitter of transistor 24. Figure 2. Nowhere does Koazechi teach or suggest a bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, and a resistor coupled to the base of the bipolar transistor, wherein the base current is proportional to a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities, the voltage difference being formed across the resistor, as required by claim 1. For at least this reason, Applicants respectfully maintain that claim 1 distinguishes over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 1 and all claims dependent thereon be withdrawn.

Regarding claim 26, Applicants respectfully maintain that Akioka, alone or in combination with Koazechi or other references of record, fails to teach or suggest that a

> base current is proportional to a voltage difference between a base-emitter voltage of a second bipolar transistor and a base-emitter voltage of the first bipolar transistor, the voltage difference being formed across a first resistor coupled to a base of the first bipolar transistor,

as required by claim 26. The Office action relies on resistor R3, which is coupled to the base of bipolar transistor Q8, of Akioka to supply this teaching. Fig. 2, 3, and 8. Akioka teaches forming a difference voltage between base-to-emittter voltages VBE of respective bipolar transistors Q1 and Q2 across a resistive element R2. Col. 4, lines 40-42. Resistive element R2 is coupled between the emitter of bipolar transistor Q2 and ground. Fig. 2, 3, and 8. In addition, Akioka teaches that bipolar transistor Q8 is configured to generate a voltage VBE which is added to K*VT to provide an output voltage VREF free of temperature dependence. Col. 5, lines 1-4. Akioka teaches that the current proportional to the thermal voltage VT flows through M4 and that this current also flows through the resistive element R3. Col 4, line 63-col. 5, line 1. Nowhere does Akioka teach or suggest base current is proportional to a voltage difference between a base-emitter voltage of a second bipolar transistor and a base-emitter voltage of the first bipolar transistor, the voltage difference being formed across a first resistor coupled to a base of the first bipolar transistor, as required by claim 26.

Koazechi fails to compensate for the shortcomings of Akioka. Koazechi teaches the voltage difference DVBE between base-emitter voltages VBE20 and VBE24, which appears across resistor 2. Col. 4, lines 14-21. Resistor 2 of Koazechi is coupled to the emitter of transistor 24. Figure 2. Nowhere does Koazechi teach or suggest base current is proportional to a voltage difference between a base-emitter voltage of a second bipolar transistor and a base-emitter voltage of the first bipolar transistor, the voltage difference being formed across a first resistor coupled to a base of the first bipolar transistor, as required by claim 26. For at least this reason, Applicants respectfully maintain that claim 26 distinguishes over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 26 and all claims dependent thereon be withdrawn.

Regarding claim 55 Applicants respectfully maintain that Akioka, alone or in combination with Koazechi or other references of record, fails to teach or suggest

> means for developing the current proportional to absolute temperature includes a resistor coupled to a base of the first bipolar transistor, a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities being formed across the resistor,

as required by claim 55. The Office action relies on resistor R3, which is coupled to the base of bipolar transistor Q8, of Akioka to supply this teaching. Fig. 2, 3, and 8. Akioka teaches forming a difference voltage between base-to-emittter voltages VBE of respective bipolar transistors Q1 and Q2 across a resistive element R2. Col. 4, lines 40-42. Resistive element R2 is coupled between the emitter of bipolar transistor Q2 and ground. Fig. 2, 3, and 8. In addition, Akioka teaches that bipolar transistor Q8 is configured to generate a voltage VBE which is added to K*VT to provide an output voltage VREF free of temperature dependence. Col. 5, lines 1-4. Akioka teaches that the current proportional to the thermal voltage VT flows through M4 and that this current also flows through the resistive element R3. Col 4, line 63-col. 5, line 1. Nowhere does Akioka teach or suggest means for developing the current proportional to absolute temperature includes a resistor coupled to a base of the first bipolar transistor, a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities being formed across the resistor, as required by claim 55.

Koazechi fails to compensate for the shortcomings of Akioka. Koazechi teaches the voltage difference DVBE between base-emitter voltages VBE20 and VBE24, which appears across resistor 2. Col. 4, lines 14-21. Resistor 2 of Koazechi is coupled to the emitter of transistor 24. Figure 2. Nowhere does Koazechi teach or suggest means for developing the current proportional to absolute temperature includes a resistor coupled to a base of the first bipolar transistor, a voltage difference between two base-emitter voltages of bipolar transistors configured to have different current densities being formed across the resistor, as required by claim 55. For at least this reason, Applicants respectfully maintain that claim 55 distinguishes

over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 55 and all claims dependent thereon be withdrawn.

Regarding claim 59, Applicants respectfully maintain that Akioka, alone or in combination with Koazechi or other references of record, fails to teach or suggest

> a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature,

as required by claim 59. The Office action relies on resistor R3, which is coupled to the base of bipolar transistor Q8, of Akioka to supply this teaching. Fig. 2, 3, and 8. Akioka teaches forming a difference voltage between base-to-emittter voltages VBE of respective bipolar transistors Q1 and Q2 across a resistive element R2. Col. 4, lines 40-42. Resistive element R2 is coupled between the emitter of bipolar transistor Q2 and ground. Fig. 2, 3, and 8. In addition, Akioka teaches that bipolar transistor Q8 is configured to generate a voltage VBE which is added to K*VT to provide an output voltage VREF free of temperature dependence. Col. 5, lines 1-4. Akioka teaches that the current proportional to the thermal voltage VT flows through M4 and that this current also flows through the resistive element R3. Col 4, line 63-col. 5, line 1. Nowhere does Akioka teach or suggest a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, as required by claim 59.

Koazechi fails to compensate for the shortcomings of Akioka. Koazechi teaches the voltage difference DVBE between base-emitter voltages VBE20 and VBE24, which appears across resistor 2. Col. 4, lines 14-21. Resistor 2 of Koazechi is coupled to the emitter of transistor 24. Figure 2. Nowhere does Koazechi teach or suggest a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, as required by claim 59. For at least this reason, Applicants respectfully maintain that claim 59 distinguishes over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 59 and all claims dependent thereon be withdrawn.

Claims 3, 7-19, 21-25, 28-37, and 56-57 apparently stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Akioka in combination with Koazechi. Regarding claim 3, Applicants respectfully maintain that the Office fails to establish a prima facie case of obviousness.

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of the ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all claim limitations.

See MPEP § 2143. Applicants respectfully maintain that the Office fails to provide a reference that teaches or suggests that

> a reference voltage produced by the voltage reference generator is proportional to a parabolic function of temperature,

as required by claim 3. Akioka teaches "a circuit for generating a constant voltage, free of dependence on temperature changes." Abstract. Koazechi teaches generating a stable reference voltage with respect to changes in temperature. Col. 1, lines 9-17. Nowhere do the references of record teach or suggest a voltage reference generator generating a reference voltage that is proportional to a parabolic function of temperature, as required by claim 3. For at least this reason, Applicants respectfully maintain that claim 3 distinguishes over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 3 be withdrawn.

Regarding claim 29, Applicants respectfully maintain that the Office fails to establish a prima facie case of obviousness. See MPEP § 2143. Applicants respectfully maintain that the Office fails to provide a reference that teaches or suggests

> adjusting an effective slope of the reference voltage as a function of temperature according to a first resistor,

as required by claim 29. Akioka teaches "a circuit for generating a constant voltage, free of dependence on temperature changes." Abstract. Koazechi teaches generating a stable reference voltage with respect to changes in temperature. Col. 1, lines 9-17. Nowhere do the references of record teach or suggest adjusting an effective slope of the reference voltage as a function of temperature according to a first resistor, as required by claim 29. For at least this reason, Applicants respectfully maintain that claim 3 distinguishes over Akioka and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 29 be withdrawn.

Claims 4-6 apparently stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U. S. Patent No. 6,198,267 to Bakker et al. (hereinafter, "Bakker") in combination with U. S. Patent No. 6,799,889 to Pennock (hereinafter, "Pennock"). Regarding claim 4, Applicants respectfully maintain that Bakker, alone or in combination with Pennock or other references of record, fails to teach or suggest

> a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature,

as required by claim 4. In the background of the invention, Bakker teaches a current generator including a resistor coupled between a drain of a PMOS-transistor and an emitter of a bipolar transistor. Col. 1, lines 28-30. That current generator also includes an operational amplifier that

> controls a control voltage at the gates of the first and second PMOS-transistors in such a manner that the voltage difference between the drains of the first and the second PMOS-transistors is virtually equal to zero. By appropriate dimensioning of the components the voltage across the resistor is proportional to the absolute temperature. Also the currents flowing through the first and the second PMOS-transistors are proportional to the absolute temperature.

Col. 1, lines 36-45. Nowhere does Bakker teach or suggest that the current generator described in the background of the invention includes a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, as required by claim 4.

Bakker teaches further the circuits of Figure 1 and 2, which include an output RG_0 that is coupled to an output transistor M_1 and resistor R_2. Bakker teaches further that

> regulation means RGMNS regulates the voltage difference between the emitters of the first and the second bipolar transistors Q_1 and Q_2 to virtually zero volt by adapting the current flowing through the second resistor R_2. The reference current can be taken from the output terminal IPTAT. If the quotient of the value of the current delivered by the first current source I_1 and the value of the current delivered by the second current source I_2 is equal to the quotient of the value of the second resistor R_2 and the value of the first resistor R_1, then the value of the reference current is substantially dependent on the value of the absolute temperature.

Col.. 3, line 65-col. 4, line 1. The current generators of Figures 1 and 2 of Bakker develop a voltage proportional to absolute temperature across a resistor that is coupled to an output RG_0, which is coupled to an output transistor M1. Nowhere does Bakker teach or suggest that developing a voltage proportional to absolute temperature across a resistor that is coupled to an output RG_0, which is coupled to an output transistor M1, of the current generators of Figure 1 and 2 includes a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, as required by claim 4.

Neither the current generator of the background section of Bakker nor the current generators of Figures 1 and 2 of Bakker teach or suggest the limitations of claim 4. Pennock fails to compensate for the shortcomings of Bakker. Pennock teaches techniques for generating a temperature dependent signal including two bipolar transistors configured to operate at different current densities. Abstract; Figures 3a-d, 4, and 5. Nowhere does Pennock teach or suggest a first bipolar transistor configured to amplify a base current of the first bipolar transistor, the base current being proportional to an absolute temperature, as required by claim 4.

For at least these reasons, Applicants respectfully maintain that claim 4 distinguishes over Bakker, Pennok, and all references of record. Accordingly, Applicants respectfully request that the rejection of claim 4 and all claims dependent thereon, be withdrawn.

In summary, claims 1, 3-26, and 28-60 are in the case. All claims are believed to be allowable over the art of record, and a Notice of Allowance to that effect is respectfully solicited. Nonetheless, if any issues remain that could be more efficiently handled by telephone, the Examiner is requested to call the undersigned at the number listed below.

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